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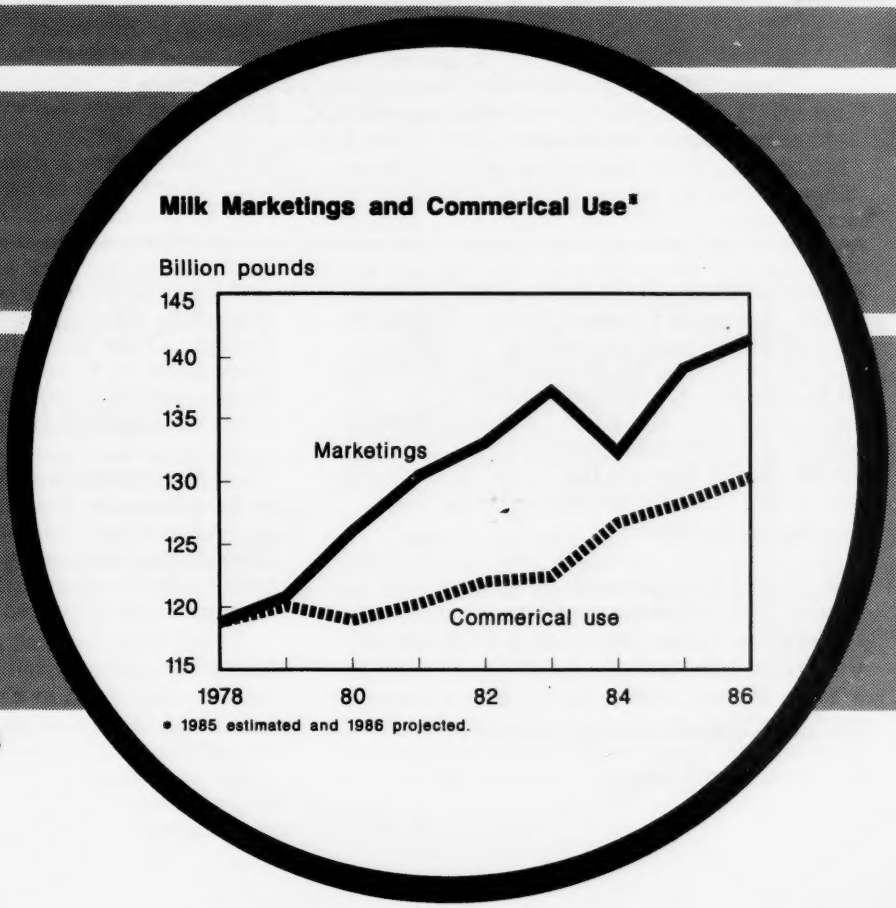

Massive milk surplus returns

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The present forecasts will be updated if needed in the World Agricultural Supply and Demand Estimates scheduled for release on October 10, November 12, and December 10, 1985.

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SUMMARY

Government purchases under the dairy price support program are sharply larger than a year ago because milk production and marketings have increased much more than the commercial disappearance of milk and dairy products. During January–August, USDA net removals (delivery basis) were equal to about 10.3 billion pounds of milk (milkfat basis), up 2.2 billion or 28 percent from the same period in 1984. For calendar 1985, removals are expected to be about 13 billion pounds, compared with 8.6 billion last year. Removals in 1986 are projected to be 10 to 17 billion pounds, assuming no diversion program and a support price of $11.60 per cwt.

With relatively favorable milk–feed price relationships, primarily from low feed prices, and ample replacements, the number of milk cows on farms has increased since the end of the diversion program. However, additional gains in the herd are expected to be limited. For 1985, the average number of cows is likely to be 1.5 percent above last year.

When compared with a year earlier, milk per cow has also recovered since the end of the diversion program. Some additional gains are expected and output per cow this year is anticipated to average 3 percent above 1984. For all of calendar 1985, milk production will be record large, running about 4.5 percent greater than 1984.

Calendar 1986 milk production is projected to be unchanged to 3 percent larger. Better management, new technology, and genetic advancement will add upward pressure on yields, but some decline in the cow herd seems likely. However, the outlook for dairy and other commodities is uncertain pending new farm legislation.

Preliminary data for first–half 1985 indicate commercial disappearance of all milk and dairy products on a milkfat basis was up about 1 percent on a daily average basis from a year ago. However, while first–quarter 1985 disappearance, after adjustments for leap year, was up 1.8 percent from a year earlier, second–quarter use was about unchanged. For all of 1985, commercial sales are expected to be about 1.3 percent higher. For 1986, they are projected to be unchanged to 3 percent larger.

Prices received by farmers for all–milk during August averaged $12.10 per cwt, $1.10 (8 percent) below a year earlier. Prices are expected to fall further below a year earlier because of surplus supplies and the lower support price.

For all of 1985, the all–milk price may average 60 to 80 cents lower than 1984's $13.45 per cwt. Differences in the assessments in 1985, compared with 1984, indicate the effective price for 1985 would be 25 to 45 cents lower than last year, which saw a 20–cent drop from 1983. In 1986, the all–milk price may be unchanged to 60 cents lower than in 1985.

Under provisions of the Dairy and Tobacco Adjustment Act of 1983, USDA on April 1, 1985, reduced the support price of manufacturing grade milk to $12.10 per cwt for milk of average fat test ($11.81 for milk testing 3.5 percent fat). USDA again reduced the support price on July 1, to $11.60 per cwt for average fat test ($11.31 for 3.5 percent fat). Both 50–cent reductions were reflected in reduced purchase prices. With lower purchase prices, the wholesale spot prices for butter, cheese, and nonfat dry milk have fallen this summer. If the level of support is held at $11.60 per cwt on October 1, the more than ample supplies will likely preclude any upward pressure on the wholesale spot prices.

The Bureau of Labor Statistics' (BLS) retail dairy price index this year is expected to average 1 to 2 percent higher than last year. In 1984, the dairy index averaged 253.2 (1967=100), a gain of 1.3 percent from 1983. The BLS retail dairy index in July stood 2.2 percent above a year earlier, but not all of the wholesale price declines since July have been reflected at the retail counter. Thus, retail prices may fall from current levels later this year.

Table 1.—U.S. dairy situation at a glance

Item	Unit or base period	Quarterly data					
		2st 1983	2nd 1984	3rd 1984	4th 1984	1st 1985	2nd 1985
Production and cow numbers:							
Total milk	Mil. lb	36,833	35,609	33,468	32,414	33,632	37,231
Milk per cow	Lb	3,321	3,296	3,097	2,996	3,109	3,393
Number of milk cows	Thou.	11,089	10,805	10,809	10,819	10,817	10,971
Prices received by farmers:							
All milk, sold to plants, 100 pounds	Dol	13.37	13.00	13.27	14.10	13.67	12.50
Percentage of parity 1/	Pct	63	57	58	59	57	55
Manufacturing grade milk, 100 pounds	Dol	11.60	12.20	12.37	13.17	12.60	11.60
Parity equivalent	Dol	20.02	21.32	21.32	21.23	21.53	21.56
Fat content	Pct	3.62	3.62	3.56	3.84	3.78	3.59
Minnesota-Wisconsin (3.5% fat), 100 pounds	Dol	12.51	12.08	12.37	12.63	12.19	11.43
Milk eligible for fluid market, 100 pounds	Dol	13.50	13.10	13.40	14.23	13.87	12.67
Price ratio and dairy ration value:							
Milk/16-percent feed price relationship	Lb	1.46	1.32	1.40	1.59	1.57	1.47
Value of concentrate ration fed, milk cows	Dol	7.46	8.32	8.46	7.95	7.54	7.49
Farm cash receipts from dairy products	Mil. dol	4,904	4,539	4,385	4,413	4,523	4,614
Production of factory products:							
Butter	Mil. lb	348.4	289.9	210.4	259.3	333.1	321.1
American cheese, whole milk	Mil. lb	834.2	758.2	610.8	591.7	655.7	788.2
Cheese other than American	Mil. lb	462.9	500.0	498.2	554.5	501.8	528.1
Canned milk, unskimmed	Mil. lb	189.3	173.7	159.9	159.2	138.1	178.9
Dry whole milk	Mil. lb	27.4	33.0	28.4	27.5	36.9	34.9
Frozen products 2/	Mil. gal	340.1	350.6	355.3	253.2	260.7	354.5
Creamed cottage cheese	Mil. lb	192.0	192.2	188.7	168.3	177.8	190.0
Total (milkfat basis) 3/	Mil. lb	22,725	20,703	17,951	17,657	19,302	22,424
Nonfat dry milk, human use	Mil. lb	446.9	355.0	265.6	224.7	284.1	409.1
Wholesale prices:							
Butter, Grade A, Chicago, pound	Ct	147.3	145.3	154.8	153.9	141.3	141.9
Cheese, American (40-pound blocks), f.o.b. Wisconsin assembling points, pound	Ct	137.5	135.9	139.9	140.3	134.3	128.2
Evaporated milk, case	Dol	22.23	22.23	22.23	22.23	22.23	22.36
Nonfat dry milk, pound, f.o.b. Central States, high heat	Ct	93.4	90.7	90.7	91.3	90.4	84.2
Dairy products (BLS)	1967=100	250.8	249.1	252.5	256.7	254.2	250.3
Retail prices (BLS):							
Consumer price index 4/	1967=100	296.9	309.7	313.1	315.4	317.4	321.2
All food 4/	1967=100	292.1	301.9	304.1	304.5	308.8	309.3
All dairy products 4/	1967=100	250.1	251.4	253.3	257.2	259.0	258.2
Fluid milk and cream	12/77=100	136.5	136.6	137.0	139.6	140.6	139.9
Whole milk	1967=100	223.2	223.3	223.7	228.4	229.7	228.8
Other	12/77=100	136.8	137.3	138.0	139.9	141.2	140.3
Manufactured dairy products	12/77=100	148.3	149.7	151.8	153.6	154.6	154.4
Butter	1967=100	253.7	253.6	263.9	269.0	265.1	261.7
Cheese	12/77=100	146.3	146.7	148.4	149.9	150.5	150.2
Frozen desserts	12/77=100	153.2	156.5	158.0	159.4	162.3	162.4
Other	12/77=100	144.1	147.8	148.8	151.1	152.9	154.6
Margarine	1967=100	258.7	282.9	295.3	295.3	297.5	299.0
Stocks, end of quarter:							
Creamery butter	Mil. lb	529.0	529.3	516.7	426.3	296.5	291.7
Cheese total 5/	Mil. lb	1,160.4	1,298.8	1,288.2	1,211.1	1,061.9	975.3
Canned milk, unskimmed	Mil. lb	49.1	54.6	91.2	103.9	42.0	50.7
Dry whole milk	Mil. lb	5.0	5.8	8.6	7.1	5.4	7.8
Total (milkfat basis) 6/	Mil. lb	22,220	23,610	23,332	20,742	16,429	15,510
Nonfat dry milk	Mil. lb	1,305.7	1,421.0	1,421.2	1,335.1	1,231.7	1,095.1
Commercial disappearance:							
Creamery butter	Mil. lb	198.6	241.3	215.6	251.5	205.7	205.0
Cheese, American	Mil. lb	570.7	572.8	564.4	571.3	515.2	564.7
Cheese, other than American	Mil. lb	508.3	559.8	582.9	637.2	558.5	585.8
Canned milk, unskimmed	Mil. lb	159.0	136.3	143.6	219.7	125.7	127.0
Milk in all products	Mil. lb	30,875	32,425	33,020	32,137	29,342	32,414
Nonfat dry milk	Mil. lb	106.4	109.6	141.6	120.1	104.7	89.8
USDA net removals:							
Butter	Mil. lb	148.9	47.2	1.5	10.7	128.7	107.9
Cheddar cheese	Mil. lb	272.2	180.9	81.0	34.8	145.7	201.9
Nonfat dry milk	Mil. lb	331.4	230.2	146.0	97.0	177.6	290.6
Evaporated milk	Mil. lb	5.0	3.6	5.1	2.8	7.1	7.0
Total (milkfat basis)	Mil. lb	5,776	2,769	842	570	4,113	4,237

1/ Seasonally adjusted prices as percentage of parity price. 2/ Ice cream, ice milk, and sherbet. 3/ Includes manufactured products for which current data are available. 4/ For all urban consumers starting January 1978. 5/ Natural plus processed American cheese held by CCC. 6/ Excludes cream and bulk condensed milk.

PRODUCTION

Expansion Continues

Milk production during June, July, and August was 6.1, 8, and 9.7 percent, respectively, above a year earlier. July's 12.4 billion pounds and August's 12.3 billion were records for each month. The increases were the result of more milk per cow and more milk cows.

Of 33 States surveyed during August, all posted gains in production from a year earlier and 23 were above 2 years earlier. Of the five leading milk production States, New York (ranked third) had output 6.6 percent above a year earlier. California (second) was up 7.9 percent. Pennsylvania (fifth) posted a gain of 8.3 percent above a year earlier. Meanwhile, Wisconsin (first) and Minnesota (fourth) had gains in total output of 13.2 and 16.4 percent, respectively.

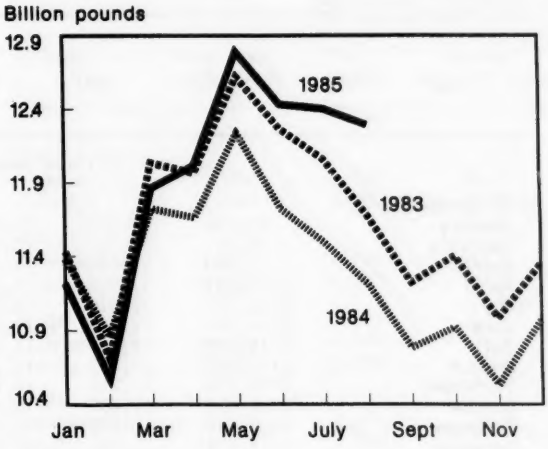
Feed and Forage Prices Lower

In general, the average price paid by farmers for 16-percent protein dairy feed has declined month-to-month since January 1984. The mid-August 1985 price averaged $165 per ton, down $12 from January of this year, and down $40 (19.5 percent) from January of 1984. Compared with a year earlier, the August price was $23 (12 percent) lower.

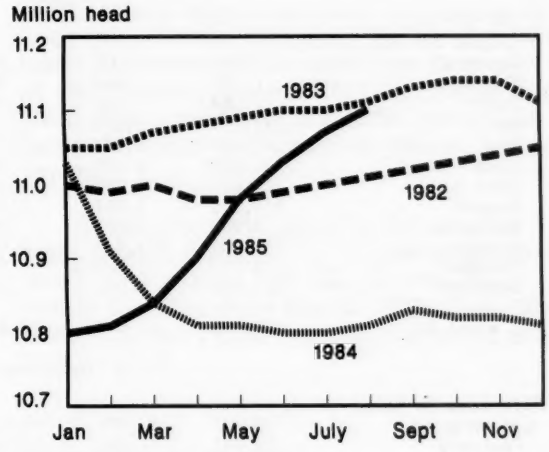
With milk prices falling proportionately more than feed prices from January to June, the milk-feed price ratio declined from 1.58 in January to 1.44 in June. However, the ratio remained unchanged in July and improved in August. Compared with a year earlier, the dairy farmer during August was able to buy 7 pounds (5 percent) more concentrate for each cwt of milk sold. If adjusted for the 50-cent-per-cwt deduction in effect last year, the milk-feed price ratio was 8 percent above August 1984. Thus, the August ratio was favorable to continued relatively heavy rates of concentrate feeding.

The feeding rate for grain and other concentrates on July 1 averaged 15.8 pounds per cow, up 6 percent from a year earlier. The milk-feed price ratio is expected to remain conducive to heavy concentrate feeding at least through late summer 1986.

U.S. Milk Production



Milk Cows on Farms



Milk Production per Cow

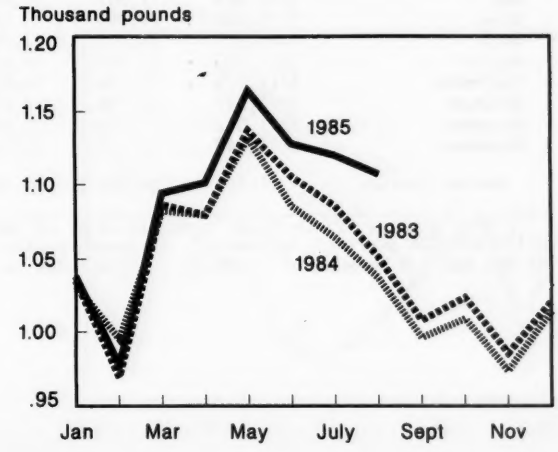


Table 2.—Milk production, milk per cow, and milk cows on farms, by months, 1982-85, with comparisons

Item	1982	1983	1984	1985 1/	Change from year earlier			
					1982	1983	1984	1985
	Million pounds				Percent			
Milk production 2/								
January	11,106	11,443	11,375	11,209	+2.8	+3.0	-0.6	-1.5
February	10,361	10,707	10,855	10,566	+2.1	+3.3	+1.4	-2.7
March	11,700	12,029	11,723	11,857	+1.6	+2.8	-2.5	+1.1
April	3/11,607	11,956	11,662	12,007	+0.7	+3.0	-2.5	+3.0
May	3/12,191	12,616	12,227	12,790	+0.9	+3.5	-3.1	+4.6
June	3/11,781	12,261	11,720	12,434	+2.0	+4.1	-4.4	+6.1
July	3/11,618	12,046	11,485	12,403	+2.3	+3.7	-4.7	+8.0
August	3/11,370	11,672	11,206	12,291	+2.4	+2.7	-4.0	+9.7
September	3/10,939	11,218	10,777		+3.0	+2.6	-3.9	
October	3/11,053	11,400	10,918		+2.7	+3.1	-4.2	
November	3/10,644	10,979	10,529		+2.4	+3.1	-4.1	
December	3/11,135	11,345	10,967		+2.2	+1.9	-3.3	
Total 4/	135,505	139,672	135,444		+2.1	+3.1	-3.0	
	Pounds				Percent			
Milk per cow 2/								
January	1,010	1,035	1,032	1,038	+1.4	+2.5	-3.0	+0.6
February	943	969	995	977	+0.9	+2.8	+2.7	-1.8
March	1,064	1,086	1,082	1,094	+0.3	+2.1	-0.4	+1.1
April	3/1,057	1,079	1,079	1,101	-0.5	+2.1	0.0	+2.0
May	3/1,110	1,137	1,132	1,164	-0.1	+2.4	-0.4	+2.8
June	3/1,072	1,105	1,085	1,128	+0.9	+3.1	-1.8	+4.0
July	3/1,056	1,085	1,064	1,120	+1.1	+2.7	-1.9	+5.3
August	3/1,033	1,051	1,037	1,107	+1.5	+1.7	-1.3	+6.7
September	3/993	1,008	996		+2.2	+1.5	-1.2	
October	3/1,002	1,024	1,009		+1.9	+2.2	-1.5	
November	3/964	985	973		+1.7	+2.2	-1.2	
December	3/1,008	1,021	1,014		+1.7	+1.3	-0.7	
Total 4/	12,306	12,585	12,495		+1.0	+2.3	-0.7	
	Thousands				Percent			
Milk cows on farms 5/								
January	10,997	11,051	11,026	10,801	+1.4	+0.5	-0.2	-2.0
February	10,993	11,051	10,910	10,811	+1.3	+0.5	-1.3	-0.9
March	10,996	11,073	10,839	10,839	+1.3	+0.7	-2.1	0.0
April	3/10,981	11,078	10,810	10,903	+1.1	+0.9	-2.4	+0.9
May	3/10,983	11,093	10,805	10,984	+1.0	+1.0	-2.6	+1.7
June	3/10,990	11,095	10,801	11,025	+1.0	+1.0	-2.6	+2.1
July	3/11,001	11,103	10,796	11,070	+1.1	+0.9	-2.8	+2.5
August	3/11,006	11,107	10,807	11,103	+0.9	+0.9	-2.7	+2.7
September	3/11,015	11,126	10,825		+0.8	+1.0	-2.7	
October	3/11,031	11,138	10,821		+0.8	+1.0	-2.8	
November	3/11,042	11,142	10,823		+0.7	+0.9	-2.9	
December	3/11,047	11,113	10,814		+0.6	+0.6	-2.7	
Annual average	11,011	11,098	10,840		+1.0	+0.8	-2.3	

1/ Preliminary. 2/ Excludes milk sucked by calves. 3/ ERS derived data consistent with published official USDA quarterly estimates. No monthly data for an individual State or region are available. 4/ May not add because of rounding. 5/ Excludes heifers not yet fresh.

The 1985 U.S. corn crop will be much larger than use and carryout stocks for 1985/86 are projected to be about twice as large as carryin. This is expected to result in corn prices at the farm for 1985/86 (October–September) of $2.35 to $2.55 per bushel. In addition, prices in second-half 1986 will depend on the 1986/87 supply-use balance and the loan rates in the new farm bill. The season average price for 1984/85 will be about $2.65 per bushel, compared with 1983/84's $3.25.

The 1985 soybean crop is also expected to be larger than use. This will likely keep soybean prices low. For 1985/86, farm prices will probably run $5.05 to $5.35 per bushel, compared with $5.85 in 1984/85 and $7.81 in 1983/84. Prices of soybean meal (Decatur) are projected to be between $105 and $135 per ton in 1985/86. They averaged about $125 per ton for 1984/85, compared with $188.20 in 1983/84.

May 1 stocks of hay were reported at 26.9 million short tons, one-third more than a year earlier. Indicated area harvested in 1985 is almost 62 million acres. With a yield of 2.4 tons per acre, production is forecast at 148 million tons. Use is expected to be about 140 million tons (down 3 percent) because of fewer roughage-consuming animal units in 1985/86 (May–April). With larger supplies and weaker use, the season average price this year is expected to be $5 to $10 per ton below the May 1983–April 1984 average of $73.80.

July Cow Inventory and Replacements Larger

Milk cows on farms this July numbered 11.050 million head, an increase of 250,000 (2.3 percent) from a year earlier. Dairy heifers (500 pounds and over) held for herd replacements were 5 million, an increase of 50,000 (1 percent) from July 1, 1984. With more of a gain in cows than in replacements, the number of heifers per 100 cows on July 1, 1985, was 45.2, down from 45.8 a year earlier but still the second largest ratio on record.

A record rate of culling during 1984 offset the large number of replacements available on January 1, 1984, to calve and enter the herd, hence the 290,000-head decline in the milk cow inventory last year. Federally inspected (FI) dairy cow slaughter in 1984 was about 3.2 million head, implying that

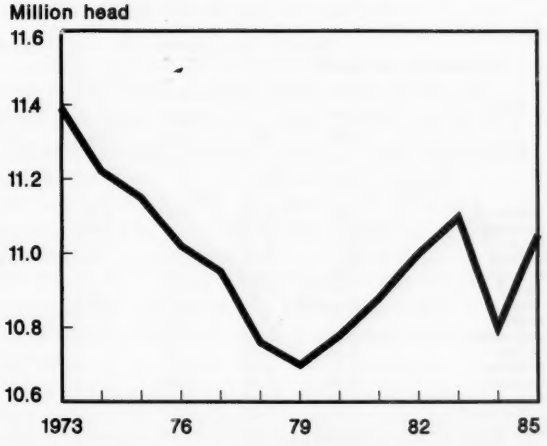
Table 3.--Milk cows and replacements, 1982–85

Date	Milk cows (1,000 head)	Replacement heifers, 500 pounds and over	
		Number	Number per 100 cows
1982			
January 1	10,986	4,547	41.4
July 1	11,000	4,780	43.5
1983			
January 1	11,047	4,545	41.1
July 1	11,100	4,880	44.0
1984			
January 1	11,109	4,532	40.8
July 1	10,800	4,950	45.8
1985			
January 1	10,819	4,757	44.0
July 1	11,050	5,000	45.2

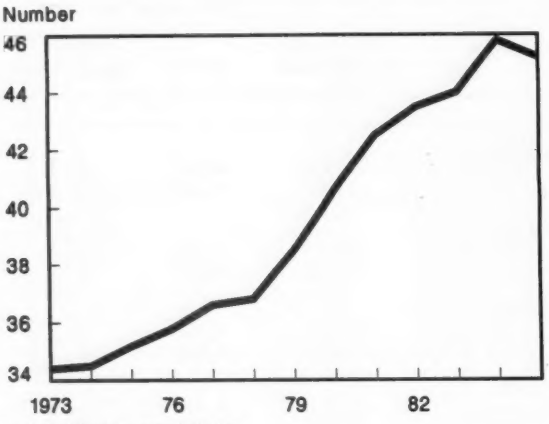
341,000 more dairy cows went to slaughter in 1984 than in 1983. However, not all of the additional dairy cow slaughter was the result of the diversion program. In fact, it seems likely that a third to a half of the extra kills last year would have occurred without the program.

Total FI cow slaughter in 1984 was 8.2 million head, implying that 5 million were beef cows. The total FI cow kill last year was nearly 1 million more than in 1983. Thus, the additional dairy cows were 34 percent of extra kills in 1984.

July Milk Cow Inventory



Dairy Heifers per 100 Milk Cows[a]



[a] July 1 heifers over 500 lbs.

Table 4.—Utility cow prices, Omaha, by months, 1982-85

Month	1982	1983	1984	1985
	Dollars per cwt			
January	36.64	36.94	33.26	39.00
February	38.11	40.92	39.69	42.79
March	39.41	42.36	44.01	43.16
April	41.26	43.04	42.88	42.30
May	43.40	42.98	42.17	41.97
June	42.73	42.26	42.16	39.38
July	42.52	41.14	41.48	36.10
August	42.62	39.63	40.86	35.90
September	41.52	37.75	39.20	
October	39.28	37.42	38.57	
November	36.58	34.14	36.86	
December	35.41	33.58	36.56	
Average	39.96	39.35	39.81	

During January–June 1985, FI dairy cow slaughter was 1.37 million head, compared with 1.74 million a year earlier, a decline of 21 percent. Assuming FI cow slaughter was 95.9 percent of total commercial cow slaughter and death loss was 1 percent (2 percent annually), the number of dairy replacements that entered the herd during January–June was 1.77 million head, 35.7 percent of the July 1, 1984, inventory. The number of replacements that entered the herd during January–June 1984 was 1.62 million head, 33.1 percent of the July 1, 1983, inventory.

Federally inspected cow slaughter through August 31 (33 weeks) totaled 4.5 million head, a decline of 15.8 percent. Dairy cow slaughter was 1.8 million head, down by nearly 20 percent, while beef cow slaughter was 2.7 million, down 13 percent.

1985 Production Will Be Record Large

With relatively favorable milk–feed price relationships (primarily from low feed prices), and ample replacements, the number of milk cows on farms has increased since the end of the diversion program. However, additional gains in the cow herd are expected to be limited because of tight cash flow and lower milk prices. For 1985, the average number of cows is likely to be 1.5 percent above last year.

The higher yields per cow that have occurred since last winter were likely the result of the much improved milk–feed price relationships and the end of the diversion

Table 5.—Corn, soybean meal, and 16-percent protein dairy ration prices, by months, 1982-85

Month	Corn, No. 2, St. Louis				Soybean meal, Decatur				16-percent dairy feed			
	1982	1983	1984	1985	1982	1983	1984	1985	1982	1983	1984	1985
	- - - $/bu. - - -				- - - $/ton - - -				- - - $/ton - - -			
January	2.65	2.52	3.41	2.86	191.0	179.3	201.9	135.2	181	175	205	177
February	2.61	2.79	3.31	2.84	191.0	177.1	184.4	125.3	180	177	201	174
March	2.66	2.99	3.55	2.86	183.6	177.3	196.4	125.9	179	175	199	172
April	2.78	3.24	3.61	2.88	190.2	186.8	190.0	117.3	179	182	199	171
May	2.78	3.24	3.58	2.81	192.4	185.8	187.4	111.5	181	184	197	170
June	2.75	3.27	3.57	2.79	183.6	175.5	174.4	110.3	179	184	195	168
July	2.68	3.39	3.43	2.72	181.9	189.3	157.6	114.0	180	182	192	168
August	2.42	3.68	3.33	2.47	169.0	232.8	151.6	121.4	177	189	188	165
September	2.32	3.60	3.09		160.8	233.6	144.9		173	198	184	
October	2.12	3.50	2.84		157.0	228.6	141.6		171	199	179	
November	2.43	3.53	2.77		173.4	224.7	135.2		172	205	177	
December	2.49	3.45	2.75		178.5	218.0	136.7		174	205	176	
Average 1/	2.56	3.27	3.27		179.4	200.7	166.8		188	177	191	

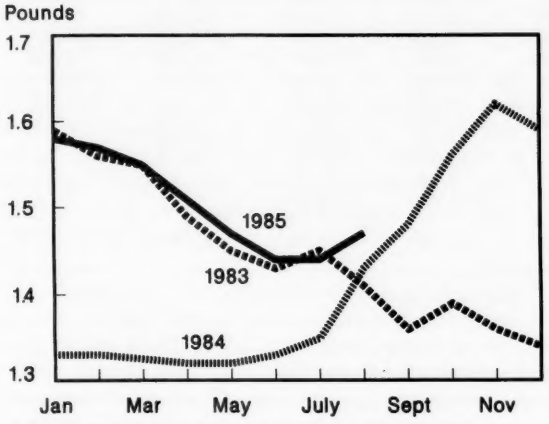
1/ Simple average of monthly prices.

Table 6.--Milk/16-percent protein dairy feed price ratio, by months, 1982-85 1/

Month	1982	1983	1984	1985
	Pounds			
Jan.	1.55	1.59	1.33	1.58
Feb.	1.53	1.56	1.33	1.57
Mar.	1.53	1.55	1.34	1.55
Apr.	1.51	1.49	1.32	1.51
May	1.47	1.45	1.32	1.47
June	1.47	1.43	1.33	1.44
July	1.47	1.45	1.35	1.44
Aug.	1.50	1.41	1.43	1.47
Sept.	1.57	1.36	1.48	
Oct.	1.61	1.39	1.56	
Nov.	1.62	1.36	1.62	
Dec.	1.60	1.34	1.59	
Avg.	1.54	1.45	1.42	

1/ Pounds of 16-percent protein ration equal in value to 1 pound of milk.

Milk/16-Percent Feed Price Ratio*



* Pounds of 16 percent dairy feed equal to a pound of milk.

program. The rate of additional gains in output per cow is expected to slow. Milk per cow this year is anticipated to average 3 percent above 1984.

For all of calendar 1985, milk production will be record large, about 4.5 percent greater than 1984. Calendar 1986 milk production is projected to be unchanged to 3 percent larger. Better management, new technology, and genetic advancement will add upward pressure on yields, but some decline in the cow herd seems likely.

PRICES

Support Reduced; Wholesale Prices Lower

Under provisions of the Dairy and Tobacco Adjustment Act of 1983, USDA on April 1, 1985, reduced the support price of manufacturing grade milk to $12.10 per cwt for milk of average fat test ($11.81 for milk testing 3.5 percent fat). USDA again reduced the support price on July 1, to $11.60 per cwt for average fat test ($11.31 for 3.5 percent fat). Both 50-cent reductions were reflected in reduced purchase prices.

During times of significant price support purchases, the CCC purchase prices for butter, cheddar cheese, and nonfat dry milk tend to become the floor for wholesale market prices. Reflecting the lower purchase prices, the wholesale spot prices for butter, cheese, and nonfat dry milk have been lower this summer. If the level of support is held at $11.60 per cwt on October 1, the more-than-ample supplies will likely preclude upward pressure this fall on the wholesale spot prices.

Cheddar cheese (Wisconsin assembly points, 40-pound blocks) during August averaged 124.25 cents per pound, 10 cents below February and 14.3 below a year earlier. Similarly, the August wholesale price of nonfat dry milk (high heat, Central States area), 80.92 cents a pound, was down 9.7 cents from February and 9.8 from August 1984. Meanwhile, the price of butter (Grade AA, Chicago) during August averaged 141.10 cents per pound, down only 1.3 cents since February, but 10.7 cents below a year earlier.

The Bureau of Labor Statistics (BLS) wholesale price index for all dairy products during August was 247.5 (1967=100), down 3.8 percent from November and 1.5 percent below a year earlier. The index is expected to remain below a year earlier through late summer 1986. The index for January-August averaged 0.6 percent above a year earlier, but for all of 1985 it is likely to average slightly lower than last year. In 1986, the index is expected to average 1 to 3 percent less than in 1985.

Farm Milk Prices To Decline

Milk prices received by farmers in August were below a year earlier. Prices are expected to fall further below a year earlier because of surplus supplies and the lower support price. The all-milk price last year increased $1.40 per cwt from June through November. However, this year the increase may be in the range of 50 to 70 cents because little strength relative to the support price is expected. Thus, assuming a support price of $11.60 per cwt on October 1, the all-milk price during November may be $1.50 to $1.70 per cwt below a year earlier.

For all of 1985, the all-milk price may average 60 to 80 cents lower than 1984's $13.45. Differences in the assessments in 1985, compared with 1984, indicate the effective price for 1985 would be 25 to 45 cents lower than last year, which saw a 20-cent drop from 1983. In 1986, the all-milk price may be unchanged to 60 cents lower than in 1985.

Table 7.--Milk prices received by farmers, by months, 1982-85

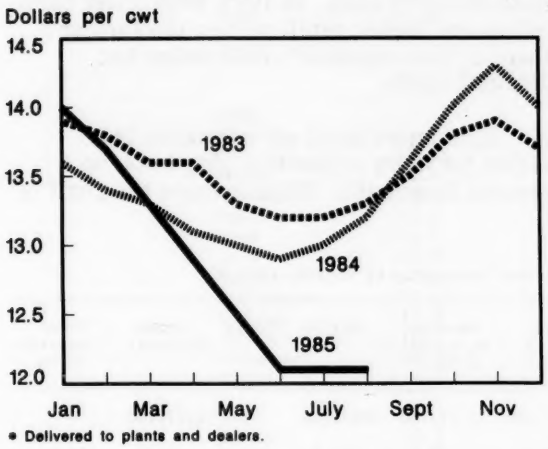
Month	All sold to plants				Manufacturing grade			
	1982	1983	1984	1985	1982	1983	1984	1985
	Dollars per cwt							
January	14.00	13.90	13.60	14.00	13.00	12.90	12.50	12.90
February	13.80	13.80	13.40	13.70	12.80	12.80	12.40	12.60
March	13.70	13.60	13.30	13.30	12.70	12.70	12.40	12.30
April	13.50	13.60	13.10	12.90	12.60	12.70	12.30	11.90
May	13.20	13.30	13.00	12.50	12.40	12.50	12.20	11.60
June	13.20	13.20	12.90	12.10	12.30	12.40	12.10	11.30
July	13.20	13.20	13.00	12.10	12.30	12.30	12.10	11.00
August	13.30	13.30	13.20	12.10	12.30	12.20	12.20	11.00
September	13.60	13.50	13.60		12.60	12.50	12.80	
October	13.80	13.80	14.00		12.90	12.90	13.10	
November	13.90	13.90	14.30		13.00	13.00	13.30	
December	13.90	13.70	14.00		13.00	12.70	13.10	
Average 1/	13.59	13.57	13.45		12.66	12.63	12.54	

1/ Simple average of reported monthly prices.

Table 8.--Wholesale dairy product prices and indexes, selected months, 1983-85

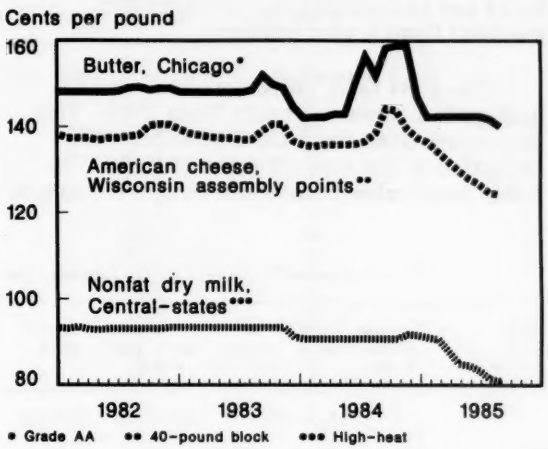
Year and month	Butter, Grade A, Chicago	Cheese, 40-lb blocks Wisconsin assembly points	Nonfat dry milk, Central States, high heat	Wholesale price index (all dairy products)	Fresh whole milk	Butter	Cheese	Ice cream
	Cents per lb.			1967=100				
1983	147.30	138.28	93.19	250.6	199.7	226.5	314.1	246.5
1984	148.81	137.96	90.90	251.7	200.8	228.8	311.6	246.2
1985								
January	141.46	136.48	90.99	255.3	206.0	216.9	314.0	249.2
February	141.25	134.26	90.57	254.0	205.3	216.6	311.6	249.8
March	141.25	132.05	89.74	253.3	205.0	216.9	309.3	251.0
April	141.89	129.93	84.87	251.5	204.6	217.5	304.2	250.9
May	141.88	128.00	84.50	250.1	203.8	217.3	301.8	248.1
June	141.88	126.75	83.28	249.4	202.8	217.6	300.1	247.8
July	141.50	124.73	81.40	248.0	202.3	215.2	295.7	248.4
August	140.74	124.25	80.92	247.5	201.9	218.4	293.5	250.2

All Milk Prices*



* Delivered to plants and dealers.

Wholesale Dairy Product Prices



* Grade AA ** 40-pound block *** High-heat

Prices received by farmers for manufacturing grade milk in Minnesota–Wisconsin (M–W) during August averaged $11.08 per cwt at 3.5 percent fat, down $1.22 (nearly 10 percent) from August 1984. With little, if any, upward price movement for butter, cheese, and nonfat dry milk this fall, the M–W price is expected to be about unchanged from the current level. For all of 1985, the M–W will likely average 80 to 90 cents below 1984's $12.29 per cwt. It is projected to average an additional 10 to 50 cents lower in 1986.

Reported U.S. manufacturing grade milk prices during July–August averaged $11 per cwt, down $1.05 from the same period in 1984. Grade B prices this fall are likely to average about $1.50 per cwt below a year earlier. For all of this year, the average is anticipated to be about $11.75 per cwt, down about 80 cents from 1983. In calendar 1986, assuming a support price of $11.60, the average may be $11.25 to $11.65.

Minimum Class I prices in Federal order markets continue to decline. These prices, which are based on the M–W price for manufacturing grade milk, should average around $13.25 per cwt during October. This is a drop of about $1.65 since January and nearly $1.25 below last October. Prices negotiated by cooperative associations for Class I milk also have been declining, but generally these drops have not been as large as for the Federal order minimums. This has resulted in a small increase in over–order payments. In September, the estimated average over–order payment is 88 cents per cwt, around 10 cents above the general level of over–order payments that has prevailed through much of this year.

Retail Dairy Prices Up Less Than All Food

For 1985, the BLS retail price index for all food items is expected to average 2 to 4 percent higher than for 1984. For 1984, the index averaged 302.9 (1967=100), up 3.8 percent from the previous year. In contrast, the dairy price index this year is expected to average only 1 to 2 percent larger than last year. In 1984, the dairy index averaged 253.2 (1967=100), a gain of 1.3 percent from 1983. The BLS retail dairy index in July stood 2.2 percent above a year earlier, but not all of the wholesale price declines since July have been reflected at the retail counter; thus, retail prices may decline from current levels later this year.

In 1984, retail prices for a half–gallon of Grade A vitamin–fortified whole milk averaged 112.7 cents, down slightly from the average price in 1983 and only a penny higher than in 1981. In contrast, retail prices for a half–gallon of whole milk increased 8.5 cents a year during 1978–81. Although small, the drop from 1983 to 1984 was the first year–to–year

decline in almost 2 decades. During the first 7 months of 1985, the retail price has averaged $1.14 per half-gallon, up 1.3 cents (1.5 percent) from a year earlier.

The 1984 farm value was 58.2 cents a half-gallon, down 1.3 cents from 1983. This decline resulted from the December 1983 reduction in the support price of milk. The lower farm value pushed the farmer's share of the consumer's milk dollar below 52 cents, down a penny from 1983 and down a nickel from the 1976 peak. In 1985, with lower farm values and higher retail prices, the farmer's share of the consumer's milk dollar has declined again.

Consumers spent an estimated $47.7 billion for dairy products during 1984, up 6 percent from 1983. Slightly more than half of

Table 9.—Retail price indexes, for all urban consumers, by months, 1983-85

Year and month	Consumer price index	All food	All dairy products	Fluid milk and cream	Whole milk	Other fluid items	Manufactured dairy products	Butter	Cheese	Frozen desserts	Other manufactured
	- - 1967=100 - -			12/77=100	1967=100	12/77=100	12/77=100	1967=100	- - - 12/77=100 - - -		
1983	298.4	291.7	249.9	136.3	222.9	136.7	148.3	254.0	146.3	153.2	144.4
1984	311.1	302.9	253.2	137.4	224.6	138.1	151.1	260.1	147.9	157.3	148.5
1985											
January	316.1	307.3	258.8	140.4	229.6	141.0	154.5	266.4	150.3	162.3	153.0
February	317.4	309.5	259.2	140.7	229.8	141.5	154.8	264.9	150.8	162.6	153.0
March	318.8	309.7	258.9	140.6	229.7	141.2	154.4	263.9	150.5	162.1	152.8
April	320.1	309.6	258.3	140.2	229.1	140.8	154.2	259.6	149.9	162.4	154.7
May	321.3	308.9	258.4	139.8	228.7	140.1	154.9	262.6	150.7	162.9	155.0
June	322.3	309.3	257.8	139.8	228.7	139.9	154.2	262.8	150.0	161.9	154.2
July	322.8	309.5	257.8	139.1	227.4	139.5	155.1	262.6	151.3	162.5	155.2

Table 10.—Retail dairy product prices, selected months, 1984-85

Year and month	Milk, fresh, whole 1/	Milk, fresh, skim	Milk, fresh, lowfat	Butter, salted, Grade AA, sticks	Natural Cheddar cheese	American processed cheese	Ice cream, prepackaged, bulk, regular	Yogurt, natural fruit flavored
	- - $ per 1/2 gallon - -			- - - $ per pound - - - - -			$ per 1/2 gallon	$ per 1/2 pint
1984								
January	1.124	.999	1.067	2.055	3.048	2.485	2.189	.522
February	1.122	.995	1.072	2.035	3.036	2.495	2.191	.517
March	1.121	1.000	1.068	2.057	3.044	2.493	2.171	.532
April	1.126	1.013	1.073	2.041	3.030	2.501	2.210	.542
May	1.124	1.005	1.074	2.058	3.026	2.472	2.203	.523
June	1.121	.999	1.067	2.054	3.058	2.502	2.193	.534
July	1.125	1.003	1.059	2.112	3.095	2.478	2.212	.529
August	1.118	1.018	1.054	2.136	3.068	2.503	2.232	.513
September	1.126	1.028	1.058	2.171	3.067	2.521	2.301	.524
October	1.132	1.021	1.058	2.180	3.088	2.536	2.259	.527
November	1.142	1.023	1.069	2.189	3.103	2.548	2.223	.530
December	1.142	1.041	1.082	2.201	3.120	2.534	2.231	.565
Average	1.127	1.012	1.067	2.107	3.065	2.506	2.218	.530
1985								
January	1.143	1.047	1.086	2.179	3.101	2.547	2.284	.563
February	1.144	1.047	1.082	2.160	3.093	2.511	2.291	.562
March	1.139	1.056	1.099	2.158	3.055	2.544	2.290	.569
April	1.141	1.055	1.090	2.136	3.060	2.525	2.291	.573
May	1.138	1.043	1.089	2.130	3.100	2.539	2.312	.576
June	1.138	1.043	1.084	2.138	3.078	2.503	2.276	.578
July	1.134	1.056	1.083	2.125	3.108	2.531	2.293	.586

1/ Vitamin fortified.

Table 11.—Whole milk: Prices and farm-to-retail spread, 1984-85

Year	Retail price	Farm value	Farm-retail spread	Farmers' share
	- - - Cents per half-gallon - - -			Percent
1984				
January	112.4	59.6	52.8	53
Febuary	112.2	57.6	54.6	51
March	112.1	57.4	54.7	51
April	112.6	57.4	55.2	51
May	112.4	57.5	54.9	51
June	112.1	57.4	54.7	51
July	112.5	57.3	55.2	51
August	111.8	57.5	54.3	51
September	112.6	57.8	54.8	51
October	113.2	58.4	54.8	52
November	114.2	59.9	54.3	52
December	114.2	60.1	54.1	53
Annual	112.7	58.2	54.5	52
1985				
January	114.3	60.4	53.9	53
Febuary	114.4	59.6	54.8	52
March	113.9	58.9	55.0	52
April	114.1	58.2	55.9	51
May	113.8	57.1	56.7	50
June	113.8	55.7	58.1	49
July	113.4	55.0	58.4	48

the gain resulted from the 3.5 percent higher commercial disappearance. Part of the gain stemmed from an increase in the average retail price and part from increased purchases for away-from-home consumption.

In 1984, wages rose 3.9 percent, while retail prices of dairy products increased 1.3 percent. As a result, the average wage earner in all manufacturing industries had to work fewer minutes to earn money to purchase dairy products. For example, it took 13.8 minutes to earn the money to buy a pound of butter in 1984, down from 14 minutes in 1983. There were similar decreases in the work time required to purchase other dairy products. The time needed to purchase dairy products has likely declined in 1985 and is expected to be down again in 1986.

UTILIZATION

Manufactured Output Reduced

During January-July of this year, the amount of raw milk used in manufacturing has increased about 2.4 billion pounds, reflecting the increase in milk marketings. Production of manufactured dairy products on a milkfat basis in 1984 was equivalent to about 78.5 billion pounds of milk, down 5.5 billion (6.5 percent) from 1983. The decrease resulted in part from additional fluid sales, but primarily from reduced farm marketings of raw milk. The decrease in raw milk use in the manufactured products sector resulted in less butter and nonfat dry milk and American-type cheese production. Butter output in 1984 declined 13.8 percent and used 3.7 billion pounds less milk. Likewise, American-type cheese production in 1984 was down 7.9 percent and used 2.4 billion pounds less milk than a year earlier. The reduced sum of milk used to make butter and American-type cheese is greater than the total reduction in raw milk used in manufacturing because of the 700-million-pound increase in use of milk to make cheese other than American-type.

1985 Commercial Use Expected To Be Higher

Sales for all of 1984 are currently estimated to have been up 3.5 percent from 1983. Preliminary data for first-half 1985 indicate commercial disappearance of all milk and dairy products (milkfat basis) was up about

Table 12.--Consumer expenditures for food and dairy products, income, and labor required to purchase specified dairy products, selected years, 1950-84

Year	Consumer expenditures			Disposable personal income	Hourly wage rate 2/
	For all foods 1/	For dairy products			
		Amount	Percentage all food		
	Billion dollars	Million dollars	Percent	Billion dollars	Dollars
1950	46.0	8,157	17.7	205.4	1.44
1955	58.1	10,301	17.7	273.3	1.86
1960	70.5	12,098	17.2	352.0	2.26
1965	85.8	13,049	15.2	475.8	2.61
1970	119.6	16,729	14.0	695.3	3.35
1971	123.4	15,176	12.3	751.8	3.57
1972	132.4	17,957	13.6	810.3	3.82
1973	147.9	19,294	13.0	914.5	4.09
1974	167.5	21,823	13.0	998.3	4.42
1975	185.2	23,316	12.6	1,096.1	4.83
1976	200.4	26,386	13.2	1,194.4	5.22
1977	217.4	27,781	12.8	1,314.0	5.68
1978	240.9	30,114	12.5	1,474.0	6.17
1979	272.2	33,475	12.3	1,650.2	6.70
1980	301.2	37,752	12.5	1,828.9	7.27
1981	328.4	41,401	12.6	2,047.6	7.99
1982	347.8	42,026	12.1	2,180.5	8.49
1983	371.0	44,974	12.1	2,340.1	8.83
1984 3/	393.3	47,672	12.1	2,576.8	9.17

	Time worked to earn money to purchase 4/				
	Butter, 1-lb.	Milk at stores 1/2-gal.	American cheese, 1/2-lb.	Ice cream, 1/2-gal.	Evaporated milk, 14&1/2-oz. can
	Minutes				
1950	29.6	15.8	11.7	5/35.6	5.1
1955	22.5	13.8	10.2	26.6	4.3
1960	19.5	12.8	9.0	22.2	4.1
1965	17.3	10.9	8.7	18.1	3.5
1970	15.5	10.3	9.0	15.1	3.4
1971	14.5	9.9	8.9	14.4	3.3
1972	13.7	9.4	8.5	13.5	3.1
1973	13.4	9.6	8.9	13.3	3.3
1974	12.8	10.4	9.9	14.6	3.9
1975	12.7	9.6	9.5	15.2	3.8
1976	14.7	9.3	9.9	14.6	3.9
1977	14.3	8.7	9.4	14.3	3.8
1978	14.5	8.4	9.3	14.2	3.7
1979	15.1	8.6	9.6	14.6	3.7
1980	15.5	8.7	9.7	15.0	3.8
1981	15.0	8.4	9.6	15.1	3.7
1982	14.4	7.9	9.3	14.8	3.6
1983	14.0	7.7	9.0	14.7	3.6
1984 3/	13.8	7.4	8.8	14.5	3.5

1/ Excludes alcoholic beverages, food donated by the Government, nonpersonal spending for food, and institutional food use. 2/ Average of all manufacturing industries. 3/ Preliminary. 4/ Based on hourly wage rates of all manufacturing industries. 5/ 1951.

1 percent on a daily average basis from a year ago. However, while first-quarter 1985 disappearance, after adjustment for leap year, was up 1.8 percent from a year earlier, second-quarter use was about unchanged. For 1985, commercial sales are expected to be 1.3 percent higher than 1984. In 1986 they are projected to be unchanged to 3 percent larger than this year.

A comparison of commercial disappearance of major dairy products during 1984 with a year earlier indicates that butter was up 2.3 percent; American-type cheese, 10.5 percent; cheese other than American, 8.3 percent; frozen dairy products, 0.5 percent; fluid products, 0.8 percent; and nonfat dry milk, 7.8 percent. Meanwhile, canned milk sales were again lower, by 6.2 percent.

Table 13.—Wisconsin out-of-State milk shipments, 1983-85

Month	1983 1/		1984 1/		1985 1/	
	Loads 2/	Volume 3/	Loads 2/	Volume 3/	Loads 2/	Volume 3/
	Number	Thousand pounds	Number	Thousand pounds	Number	Thousand pounds
January	13	611	44	2,156	97	4,753
February	7	329	42	2,058	89	4,361
March	1	47	64	3,136	65	3,185
April	1	47	75	3,675	73	3,577
May	9	423	35	1,715	17	833
June	3	141	148	7,252	0	0
July	28	1,372	71	3,479	0	0
August	62	3,038	236	11,564	36	1,764
September	258	12,642	484	23,716		
October	57	2,793	486	23,814		
November	54	2,646	447	21,903		
December	50	2,450	254	12,446		
Total	543	26,539	2,386	116,914		

1/ Changes in marketing practices in the Chicago market and adjacent Federal order markets may affect the comparability of these data. 2/ Includes out-of-State skim milk shipments. 3/ Average weight of load increased from 47,000 pounds to 49,000 after July 1, 1983.

Table 14.—Production of selected manufactured dairy products, 1984-85, with comparisons

Item	Jan.-July 1984	Jan.-July 1985 1/	Change
	Million pounds		Percent
Butter	706 4	748.9	+6.0
Cheese			
American	1,664.5	1,695.3	+1.8
Other	1,134.0	1,207.8	+6.5
Creamed cottage 2/	578.0	577.5	-.1
Canned milk	381.4	374.9	-1.7
Dry whole milk	73.5	83.4	+13.5
Ice cream (gal)	536.1	530.4	-1.1
Milk equivalent 3/	46,787	49,213	+5.2
Nonfat dry milk	775.2	834.6	+7.7

1/ Preliminary. 2/ Creamed and lowfat. 3/ Total reported manufactured products.

Table 15.—Dairy sales, January-July, 1984-85

Item	1984	1985	Change
	Million pounds		Percent
Total milk 1/	72,612.0	73,040.0	+0.6
Manufactured products:			
American cheese	1,297.2	1,270.4	-2.1
Other cheese	1,278.6	1,339.4	+4.8
Cottage cheese 2/	578.0	577.5	-.1
Butter	505.9	484.1	-4.3
Ice cream	2,573.5	2,546.1	-1.1
Ice milk	1,014.6	1,058.5	+4.3
Canned milk	325.7	293.8	-9.8
Nonfat dry milk	278.0	239.0	-14.0
Fluid products 3/			
Whole milk	10,264.0	9,9040.0	-3.3
Skim and lowfat milk	9,380.0	9,973.0	+6.5

1/ Milk-equivalent, fat-solids basis. 2/ Creamed and low-fat. 3/ January-July based on Federal order data. Percent change adjusted for calendar composition and seasonality.

For the first 7 months of 1985, preliminary data indicate lower sales of butter (4 percent), American-type cheese (2 percent), canned milk (10 percent), and nonfat dry milk (30 percent). Sales of cheese other than American were up 5 percent and fluid products were up about 1 percent.

Table 16.—Commercial disappearance: Total milk, annual and quarters, 1982-85 1/

Item	1982	1983					1984					1985 2/	
		Quarters					Quarters						
		I	II	III	IV	Total	I	II	III	IV	Total	I	II
		Billion pounds											
Production	135.5	34.2	36.8	34.9	33.7	139.7	34.0	35.6	33.5	32.4	135.4	33.6	37.2
Farm use	2.4	.6	.6	.6	.6	2.4	.8	.8	.8	.8	3.1	.8	.6
Marketings	133.1	33.6	36.2	34.3	33.1	137.3	33.2	34.8	32.7	31.6	132.4	32.8	36.6
Beginning commercial stocks	5.4	4.6	5.2	5.3	5.2	4.6	5.2	5.3	5.6	5.2	5.2	4.9	5.0
Imports	2.5	.6	.5	.6	.9	2.6	.6	.6	.7	.8	2.7	.6	.6
Total supply	141.0	38.8	42.0	40.2	39.2	144.5	39.0	40.8	39.0	37.6	140.3	38.4	42.2
Ending commercial stocks	4.6	5.2	5.3	5.2	5.2	5.2	5.3	5.6	5.2	4.9	4.9	5.0	5.5
Net removals	14.3	5.6	5.8	3.1	2.3	16.8	4.5	2.8	.8	.6	8.6	4.1	4.2
Commercial disappearance (actual)	122.1	28.0	30.9	32.0	31.6	122.5	29.2	32.4	33.0	32.1	126.7	29.3	32.4
Percent change 3/	+1.5	-2.1	+.3	+.7	+2.0	+0.3	4/+2.9	+5.0	+3.3	+1.5	4/+3.2	4/+1.8	-0.0

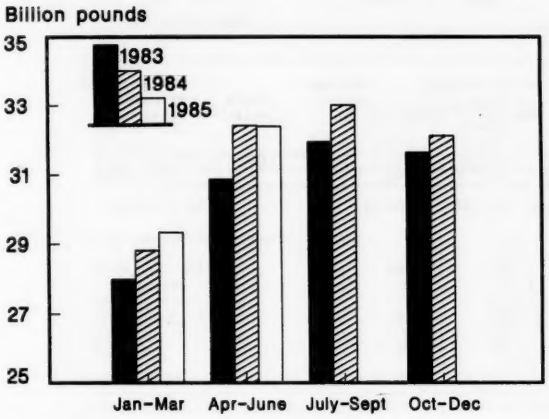
1/ Milkfat basis. Totals may not add because of rounding. 2/ Preliminary. 3/ From year earlier, using unrounded data. 4/ On a daily average basis.

Table 17.—Commercial disappearance: Selected manufactured dairy products, 1982-85 1/

Year and quarter	Butter 2/	Cheese		Nonfat dry milk	Canned milk	Frozen products 4/
		American 3/	Other			
	Million pounds					Million gallons
1982	897.3	2,166.8	2,044.6	447.7	715.3	1,178.2
1983-1st Qtr.	209.5	466.9	494.6	109.6	160.8	264.2
2nd Qtr.	198.6	570.7	508.3	106.4	159.0	340.1
3rd Qtr.	217.0	500.2	521.1	122.4	144.5	368.4
4th Qtr.	256.6	545.4	610.4	121.6	221.4	251.5
Total	881.7	2,083.3	2,134.3	459.9	685.8	1,224.2
1984-1st Qtr.	194.0	545.1	530.9	124.4	144.1	271.1
2nd Qtr.	241.3	572.8	559.8	109.6	136.3	350.6
3rd Qtr.	215.6	564.4	582.9	141.6	143.6	355.3
4th Qtr.	251.5	571.3	637.2	120.1	219.7	253.2
Total	902.3	2,253.6	2,310.9	496.0	643.6	1,230.4
1985-1st. Qtr. 5/	205.7	515.2	558.5	104.7	125.7	260.7
2nd Qtr.	205.0	564.7	585.8	89.8	127.0	354.5

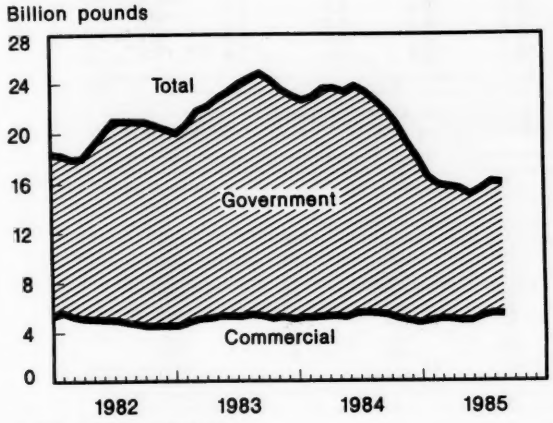
1/ Totals may not add because of rounding. 2/ Imports include butter-equivalent of butteroil. 3/ Imports include Colby cheese; stocks do not include processed cheese. 4/ Excludes Mellorine. 5/ Preliminary.

Commercial Use of All Milk Products*



* Milkfat basis. Jan-Mar 1984 adjusted for leap year.

Dairy Product Stocks*



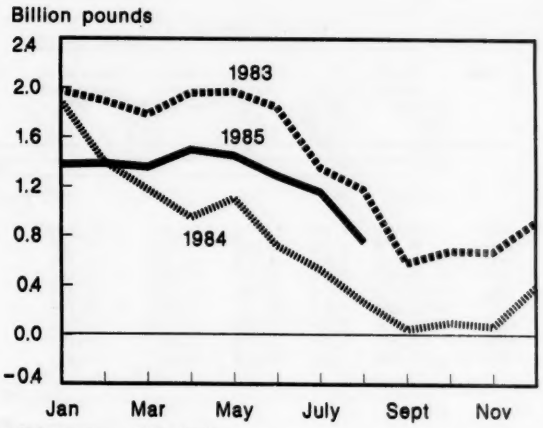
* First of month, milkfat basis.

USDA Stocks Lower

Stocks held by USDA on August 1 were equivalent to 10.5 billion pounds of milk (milkfat basis), down 6.6 billion (38 percent) from a year earlier. Holdings by the Government have fallen sharply since June 1, 1984, because purchases have been down in relation to the amount of program use. Government stocks are not likely to decline further, though, given the projected program use and the expected levels of removals this year and next.

USDA holdings of cold-storage butter on August 1 were 230 million pounds, a decline of

USDA Dairy Product Purchases*



* Net removals, milkfat basis.

213 million (48 percent) from a year earlier. Meanwhile, USDA's American cheese stocks (including processed American) in cold storage were 581.5 million pounds, a drop of 218.3 million (27 percent).

Stocks held by the trade on August 1 were equal to about 5.5 billion pounds of milk (milkfat basis), a drop of 100 million from a year earlier. The trade held 34 million pounds of butter, about 1 million more than last year. They had reduced their total stocks of cheese by about 12 million pounds from August 1, 1984.

CCC Purchases
More Than a Year Earlier

In 1985, USDA net removals (delivery basis) under the milk price-support program are expected to total about 13 billion pounds (milkfat basis). In 1986, they are projected to be 10 to 17 billion. This year, removals each month from March to August have been more than a year earlier. Total purchases for January-August 1985 were equal to 10.3 billion pounds of milk (milkfat basis), compared with 8 billion over the same period in 1984. Net removals totaled 8.6 billion pounds in calendar 1984, down by nearly half from 1983. Removals were lower because of reduced marketings (lower production and additional farm use) and increased commercial disappearance.

Table 18.—Milk and dairy product sales (domestic disappearance, commercial sources), total and per capita, United States, 1976-84 1/

Year	Fluid milk products sales					Butter	Cheese			Evaporated and condensed	
	Fluid whole milk	Cream 2/	Low-fat milk 3/	Total product weight	Whole milk equivalent 4/		Whole and part skim milk 5/ American	Whole and part skim milk 5/ Other	Cottage cheese 6/	Whole milk	Skimmed milk
	Total sales										
	Million pounds										
1976	37,061	1,189	17,710	55,960	51,502	932	1,917	1,441	1,023	1,046	783
1977	35,638	1,199	18,988	55,825	51,380	860	1,916	1,489	1,029	915	854
1978	34,938	1,214	19,813	55,965	51,175	894	2,055	1,621	1,036	885	772
1979	33,937	1,251	20,647	55,835	51,386	921	2,116	1,698	1,010	896	750
1980	32,754	1,276	21,743	55,773	50,855	894	2,015	1,795	1,017	839	747
1981	31,685	1,316	22,443	55,444	50,215	880	2,202	1,841	992	914	726
1982	30,816	1,381	23,025	55,222	49,346	891	2,226	1,990	978	905	701
1983 7/	30,405	1,484	23,979	55,868	49,705	897	2,074	2,096	970	879	732
1984 7/	29,766	1,615	25,278	56,659	50,624	900	2,239	2,271	973	862	873
	Per capita sales 8/										
	Pounds										
1976	172	5.5	82.2	260	239	4.3	8.8	6.6	4.7	4.8	3.6
1977	164	5.5	87.1	256	236	3.9	8.7	6.8	4.7	4.2	3.9
1978	159	5.5	89.9	254	232	4.0	9.3	7.3	4.7	4.0	3.5
1979	152	5.6	92.5	250	230	4.1	9.4	7.6	4.5	4.0	3.3
1980	145	5.7	96.3	247	225	3.9	8.9	7.9	4.5	3.7	3.3
1981	139	5.8	98.4	243	220	3.8	9.6	8.0	4.3	4.0	3.2
1982	134	6.0	100.0	240	214	3.8	9.6	8.6	4.2	3.9	3.0
1983 7/	131	6.4	103.1	240	214	3.8	8.9	9.0	4.1	3.8	3.1
1984 7/	126	6.9	107.6	241	216	3.8	9.5	9.6	4.1	3.6	3.7

Year	Frozen products				Dry products				
	Ice cream	Ice milk	Sherbet	Other	Mello-rine	Whole milk	Nonfat dry milk	Butter-milk	Whey 9/
	Total sales								
	Million pounds								
1976	3,928	1,574	322	64	112	33	743	38	527
1977	3,887	1,694	324	72	90	34	698	59	530
1978	3,914	1,705	312	77	78	56	640	50	543
1979	3,893	1,632	288	72	75	66	690	42	597
1980	3,983	1,614	284	62	63	63	643	42	604
1981	3,996	1,601	288	10/144	54	39	566	45	629
1982	4,090	1,543	296	10/150	49	34	562	40	669
1983 7/	4,231	1,623	308	10/130	49	93	627	44	722
1984 7/	4,241	1,696	296	10/136	44	98	650	41	756
	Per capita sales 8/								
	Pounds								
1976	18.1	7.2	1.5	0.3	0.5	0.2	3.4	0.2	2.4
1977	17.7	7.7	1.5	.3	.4	.2	3.2	.3	2.4
1978	17.6	7.7	1.4	.4	.4	.3	2.9	.2	2.4
1979	17.3	7.3	1.3	.3	.3	.3	3.0	.2	2.7
1980	17.5	7.1	1.3	.3	.3	.3	2.8	.2	2.7
1981	17.4	7.0	1.3	.6	.2	.2	2.5	.2	2.7
1982	17.6	6.7	1.3	.6	.2	.1	2.4	.2	2.9
1983 7/	18.1	6.9	1.3	.6	.2	.4	2.7	.2	3.1
1984 7/	18.0	7.2	1.3	.6	.2	.4	2.7	.2	3.2

1/ Excludes milk used on farms where produced and distribution from USDA supplies; includes sales to the Armed Services for use in the United States. 2/ Includes milk and cream mixtures. 3/ Includes skim milk, buttermilk, flavored milk drinks, and yogurt. 4/ Fat-solids basis. 5/ Excludes cottage cheese. 6/ Includes full-skim American. 7/ Preliminary or estimated. 8/ Based on resident population, except fluid milk product sales, which are based on estimated population using fluid products from purchased sources. 9/ Includes modified whey products starting 1975. 10/ Includes frozen yogurt.

Table 19.--Sales of selected fluid milk, cream, and specialty products, total and per capita, 1977-84

Item	1977	1978	1979	1980	1981	1982	1983 1/	1984 1/
				Million pounds				
Beverages:								
Whole milk, plain	34,300	33,634	32,780	31,745	30,806	30,095	29,633	28,828
Lowfat milk	13,573	14,458	15,237	16,203	16,900	17,429	18,085	18,980
Skim milk	2,639	2,576	2,631	2,673	2,621	2,534	2,556	2,801
Flavored milk & drinks	2,525	2,484	2,385	2,313	2,295	2,197	2,354	2,563
Buttermilk	1,016	996	950	941	893	934	991	1,007
Total 2/ 3/	54,093	54,185	54,017	53,908	53,546	53,217	53,644	54,202
Cream and specialty produ								
Half and half	541	544	550	562	576	588	620	678
Light cream	68	71	67	55	55	62	67	74
Heavy cream	128	124	140	149	156	164	187	211
Sour cream, dips	367	380	399	415	429	462	497	536
Yogurt	534	565	567	589	582	624	740	841
Eggnog	94	95	94	95	100	105	113	116
Total 3/	1,732	1,780	1,817	1,865	1,898	2,005	2,225	2,457
				Pounds per capita 4/				
Whole milk, plain	157.41	152.61	146.93	140.59	135.11	130.68	127.40	122.72
Lowfat milk	62.29	65.60	68.30	71.76	74.12	75.68	77.75	80.80
Skim milk	12.11	11.69	11.79	11.84	11.50	11.00	10.99	11.93
Flavored milk & drinks	11.59	11.27	10.69	10.24	10.07	9.54	10.12	10.91
Buttermilk	4.66	4.52	4.26	4.17	3.92	4.06	4.26	4.29
Half and half	2.48	2.47	2.47	2.49	2.53	2.55	2.66	2.89
Light cream	.31	.32	.30	.24	.24	.27	.29	.32
Heavy cream	.59	.56	.63	.66	.68	.71	.81	.90
Sour cream, dips	1.68	1.72	1.79	1.84	1.88	2.01	2.14	2.28
Yogurt	2.45	2.57	2.54	2.61	2.55	2.71	3.18	3.58
Eggnog	.43	.43	.42	.42	.44	.46	.49	.49

1/ Preliminary. 2/ Total includes filled and imitation milk. 3/ Total may not add due to rounding. 4/ Based on estimated population using fluid products from purchased sources.

Table 20.--Sales of individual fluid products as percent of average daily fluid milk sales, all Federal order markets, 1970, 1975, 1978-84 1/

Fluid items	1970	1975	1978	1979	1980	1981	1982	1983	1984
					Percent				
Whole milk 2/	76.1	65.6	59.8	58.4	56.7	55.6	54.7	53.1	50.9
Flavored whole milk 3/	2.5	2.6	2.5	2.3	2.0	1.5	1.4	1.5	1.7
Total whole milk	78.6	68.2	62.3	60.7	58.7	57.1	56.0	54.6	52.7
Lowfat milk 4/	12.1	21.4	26.0	27.5	29.1	30.5	31.5	32.2	33.4
Plain	3.3	11.6	18.0	20.7	22.8	25.2	26.5	27.5	28.8
Solids added	8.8	9.8	8.0	6.8	6.3	5.4	5.1	4.7	4.6
Skim milk	4.3	4.2	4.4	4.5	4.6	4.5	4.4	4.4	4.7
Plain	1.1	1.7	2.3	2.7	2.9	3.3	3.4	3.4	3.7
Solids added	3.2	2.5	2.1	1.8	1.7	1.2	1.0	1.0	1.0
Buttermilk	1.9	1.8	1.7	1.6	1.6	1.6	1.8	1.9	1.9
Yogurt	.3	.7	1.0	.9	.9	1.0	1.0	1.2	1.4
Flavored milk drinks	.8	1.5	2.4	2.5	2.7	2.9	2.8	3.0	3.0
Total skim and lowfat items	19.4	29.6	35.5	37.0	38.9	40.5	41.5	42.7	44.4
Milk and cream mixtures	1.1	.9	.9	1.0	1.0	1.0	1.0	1.1	1.2
Light cream	.2	.2	.2	.1	.1	.1	.1	.1	.2
Heavy cream	.2	.2	.2	.2	.3	.3	.3	.3	.3
Sour cream	.4	.6	.7	.7	.7	.7	.8	.9	.9
Total cream items	.8	1.0	1.1	1.0	1.1	1.1	1.2	1.3	1.4
Eggnog	.2	.2	.2	.2	.2	.2	.2	.2	.2
Total fluid milk and cream	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Total packaged disposition in and out of the marketing area, by regulated handlers. Totals may not add due to rounding. 2/ Includes whole milk equivalent of small quantity of concentrated milk. 3/ Includes small amount of flavored milk drinks. 4/ Includes 1 percent lowfat milk.

Table 21.--U.S. domestic civilian disappearance of milk on a fat-solids-basis, commercial and noncommercial sources, selected years, 1970-84

Year	Civilian disappearance				Total military utilization 2/	Consumption excluding donations from USDA supplies		
	Consumed on farms 1/	USDA donations to civilian channels and National School Lunch and Special Milk Programs	Commercial sources	All sources		Civilian	Military	Total
	Million pounds							
1970	2,196	7,645	103,371	113,212	2,419	109,029	1,788	110,817
1971	2,117	8,020	103,782	113,919	2,031	109,393	1,608	111,001
1972	1,914	7,406	106,563	115,883	1,671	111,977	1,258	113,235
1973	1,766	7,021	106,721	115,508	1,257	111,987	1,257	113,244
1974	1,643	4,959	107,376	113,978	1,137	112,519	1,137	113,656
1975	1,495	5,780	108,148	115,423	1,075	113,143	1,075	114,218
1976	1,392	3,982	111,276	116,650	1,013	116,168	1,013	117,181
1977	1,283	6,492	110,401	118,176	996	115,184	996	116,180
1978	1,168	5,785	113,263	120,216	977	117,931	977	118,908
1979	1,031	5,820	115,309	122,160	1,163	119,840	1,163	121,003
1980	943	7,058	114,704	122,705	1,067	118,347	1,067	119,414
1981	886	4,645	117,963	123,494	1,019	119,749	1,006	120,755
1982	839	8,552	119,425	128,816	1,369	121,164	1,010	122,174
1983	842	13,124	119,904	133,870	1,307	121,646	1,019	122,665
1984 3/	824	12,257	123,327	136,408	1,361	124,951	1,081	126,032

	Per capita civilian disappearance 4/				Civilian consumption excluding donations from USDA supplies
	Consumed on farms 1/	USDA donations to civilian channels and National School Lunch and Special Milk Programs	Commercial sources	All sources	
	Pounds				
1970	11	38	511	561	540
1971	10	39	507	556	534
1972	9	36	514	558	539
1973	8	34	509	551	534
1974	8	24	507	539	532
1975	7	27	506	540	529
1976	6	18	515	540	538
1977	6	30	506	542	528
1978	5	26	514	545	535
1979	5	26	517	548	538
1980	4	31	508	544	525
1981	4	20	518	542	525
1982	4	37	519	560	527
1983	4	56	516	576	524
1984 3/	4	52	526	582	533

1/ Includes a small amount of farm-churned butter sold. 2/ Includes any quantities used by military in civilian feeding programs abroad. 3/ Preliminary. 4/ Aggregate in each category divided by total civilian population.

Table 22.--Dairy product stocks, August 1, 1983-85

Item	1983	1984	1985
	Million pounds		
Commercial:			
Butter	29.6	46.6	47.5
American cheese	391.7	365.9	350.6
Other cheese	111.3	107.2	110.4
Nonfat dry milk	99.2	72.9	85.9
Milkfat	193.7	198.8	196.5
Solids-not-fat	269.1	237.2	247.3
Total, milkfat basis	5,479.4	5,574.3	5,482.6
Government:			
Butter	558.8	443.0	229.9
Amer. cheese 1/	752.9	799.8	581.5
Nonfat dry milk	1,340.4	1,334.3	1,001.4
Milkfat	692.2	614.2	372.4
Solids-not-fat	1,521.4	1,530.1	1,142.7
Total, milkfat basis 1/	18,979.2	17,051.5	10,495.5

1/ Includes processed American cheese stocks held by CCC.

Table 23.--USDA dairy purchases, with comparisons, 1984-85 1/

Item	January-August		
	1984	1985	Change
	Million pounds		Percent
Butter	194.4	268.7	+38.2
American cheese	403.2	473.3	+17.4
Nonfat dry milk	552.1	660.1	+19.6
Evaporated milk	14.2	17.4	+22.5
Milk-equivalent, fat-solids basis	8,028.2	10,262.6	+27.8

1/ Deliveries minus unrestricted sales.

Table 24.--Uncommitted CCC inventories, selected dates, 1983-85

Date	Butter	American cheese	Nonfat dry milk	Total milkfat basis
	Million pounds			Billion pounds
Sept. 1, 1983	457.5	928.9	1,348.8	18.6
Jan. 1, 1984	341.7	838.3	1,372.3	15.3
July 1, 1984	340.1	868.9	1,377.2	15.6
Aug. 1, 1984	300.6	867.6	1,376.0	14.8
Sept. 1, 1984	254.4	813.0	1,246.1	13.3
Jan. 1, 1985	186.9	602.3	1,120.2	9.8
July 1, 1985	168.8	620.3	974.1	9.6
Aug. 1, 1985	159.1	665.1	966.9	9.9
Sept. 1, 1985	149.6	660.2	982.4	9.6

Table 25.--U.S. dairy trade, 1982-85 1/

Year and quarters	Imports		Exports	Shipments 2/
	Cheese	Other		
	Million pounds			
1982				
1st	359	62	1,567	153
2nd	439	126	952	157
3rd	538	43	610	129
4th	792	117	859	163
Year 3/	2,128	349	3,988	602
1983				
1st	512	121	508	152
2nd	493	45	623	158
3rd	532	44	379	130
4th	736	132	614	136
Year 3/	2,273	343	2,124	577
1984				
1st	465	104	487	175
2nd	548	63	827	174
3rd	668	59	1,065	171
4th	753	82	559	114
Year 3/	2,434	307	2,938	634
1985				
1st	474	169	280	141
2nd	522	65	1,106	145

1/ Milk-equivalent, fat basis. 2/ To U.S. territories. 3/ May not add because of rounding.

PATTERNS OF EXIT FROM DAIRYING

by

James J. Miller 1/

ABSTRACT: Approximate exit rates were derived from data contained in the Agricultural Censuses. In 1969, about 6 percent of U.S. dairy farms quit. The rate fell to 1.4 percent in 1974, rose to 3.3 percent in 1978, and dropped again to 1.2 percent in 1982. The percentage of cows in exiting herds was 3.1 in 1969, 1.2 in 1974, 1.9 in 1978, and only 0.8 in 1982. Regional rates also were calculated for 1978 and 1982. Correction of the current milk surplus would require substantial structural adjustment.

Keywords: Milk, production, exit rates, structural adjustment.

Reasons for Leaving Dairying

Dairying, like any other mature industry, has a constant flow of producers leaving the industry. This exit rate, along with the entry rate of new producers and the net expansion rate of remaining producers, shapes the level of milk production. Many factors can cause the exodus of dairy farmers. These fall into three groups: voluntary reasons, management problems, and factors largely beyond the control of individual producers.

Retirement without a family member to continue the operation is a major reason for exit. Other dairy producers leave simply because they dislike dairying. Farm or off-farm alternatives lure some. While considerably less important today, many farmers got rid of their herds to specialize in other commodities during the fifties and sixties.

Herds with management problems will be squeezed out sooner or later. Inefficient production is the major cause, either a failure to reach sufficient output or inefficient use of inputs. Poor financial management can doom herds that are otherwise well managed. A few producers repeatedly fail to meet acceptable standards of milk quality.

Personal circumstances, such as health problems, death, or the breakup of a marriage or partnership, force some exits. Others are caused by such risks of farming as extended periods of low crop yields or major casualty losses. In fringe areas, collapse of local milk or input markets may cause farmers to leave dairying. Low milk prices are the remaining major cause of involuntary exit. Sharp price declines or extended periods of low prices will push out some dairy farmers. Theoretically, a well managed price-support program will minimize this type of forced exit.

Voluntary exit and the loss of herds with management problems actually help maintain a healthy, efficient industry. From an industry view, such exits are troubling only if the rate is erratic enough to be destabilizing. However, exit forced by circumstances beyond the individual's control may be detrimental to the industry's health. The most vulnerable firms are forced out. While efficiency diminishes vulnerability, it can be overshadowed by age of operator, access to inherited capital, attitudes of lenders, and other factors. A progressive, efficient producer might have a considerably lower probability of surviving this type of shock than an inefficient producer.

The price-support program has the potential to cause adverse structural change. A period of overly generous price supports delays beneficial exit and encourages efficient producers to increase their vulnerability. The inevitable lowering of price supports forces the exit of vulnerable producers to reestablish a supply/demand balance. The farm sector of

1/ Agricultural economist, National Economics Division, Economic Research Service.

Table A.--Farms leaving and remaining in milk production, by census year, 1969-82 1/

Year	Continuing farms		Exiting farms			
	Number	Average herd size	Number	Average herd size	As percent of farms	As percent of cows
1969	339,653	31.2	20,449	16.0	6.0	3.1
1974	242,189	42.2	4,784	36.4	1.4	1.2
1978	213,961	42.7	7,046	24.7	3.3	1.9
1982	197,269	54.1	2,333	36.4	1.2	.8

1/ Excludes farms without reported sales of milk or cream.

the dairy industry then may be temporarily short of capacity when the backlog of exiting dairy farmers dissipates.

From an industry view, mere changes in ownership are not particularly significant since capacity is not affected. True exit occurs only when facilities are abandoned (at least temporarily). Probably only a minority of departing dairy farmers represent actual exit.

Procedures

One rather ignored line in the Census of Agriculture reports shows the number of farms that had no inventory of milk cows at the end of the census year but reported sales of dairy products during that year. It also reports the dollar value of sales of milk and cream. The number of farms in this category appears to be an excellent proxy for the number of exiting dairy farmers whose facilities do not remain in use. In addition, the value figure allows an approximation of the average size of exiting herds.

The data are not a direct count of exiting dairy producers. Some continuing dairy farms might happen to be without cows on December 31. A few farms may sell the milk of beef cows. Conversely, some farmers who quit commercial milk production may still have had a few cows on the inventory date, particularly if they kept their replacement heifers for later sale. Despite these potential inaccuracies, the number of farms in this category should be quite close to the number exiting that year.

The number of farms without ending inventory but with reported sales was expressed as a percentage of farms showing both sales and inventories. This was done on a State and regional basis for 1978 and 1982 and on a national basis for 1969, 1974, 1978, and 1982. Census data are not completely comparable for different years (particularly those for 1978), so caution must be used in interpretation of these results.

A rough estimate of the average size of exiting herds was made by dividing average sales of these farms by one-half of the average sales per cow for farms remaining in dairying. This procedure assumes that exiting farms averaged one-half year's production and had average marketings per cow. This average herd size was then used to calculate the number of milk cows in exiting commercial herds as a percentage of all cows in herds selling milk or cream. Farms exiting dairying probably average lower output per cow, causing this procedure to understate the number of cows in exiting herds. However, the effect of exit on milk production would not be affected by this inaccuracy.

U.S. Exit Rates

Large numbers of farmers quit dairying in 1969. About 6 percent of the dairy farms left that year. However, these herds averaged only about half as large as the average 31 cows on continuing operations. Exiting herds equaled 3.1 percent of the ending cow inventory. Many of these departures resulted from farmers dropping milk cows as a supplementary enterprise.

In 1974, the proportion of farms leaving was lower, but exiting herds were much closer to average size than during 1969. Only 1.4 percent of herds exited that year. These herds averaged 36 cows, compared with 42 cows in continuing herds. The exit rate in terms of milk cows was 1.2 percent. The 1974 data are difficult to interpret because of the dramatic

change in profitability during the year. Conditions in early 1974 were quite favorable, but higher feed prices, lower milk prices, and rapid inflation produced a cost-price squeeze by late 1974. The relatively low exit rate probably reflects the favorable conditions of late 1973 and early 1974 rather than the developing squeeze.

The 1978 data are the least comparable to other years because of different statistical techniques. The exit rate of herds may be somewhat overstated, but the error in terms of cows probably is insignificant. In any case, the exit rates of both farms (3.3 percent) and cows (1.9 percent) were higher than in 1974. Although dairying was relatively profitable in 1978, the general economy was vigorous and the exit rate probably reflected a lagged response to favorable grain alternatives of the mid-seventies.

The exit rate was very low in 1982--only 1.2 percent of farms and 0.8 percent of milk cows. Real profitability of milk production was below the peak of the late seventies but remained modestly favorable. The support price assured producers that returns would not deteriorate sharply. Meanwhile, competing farm enterprises were unattractive and the economy was in a severe recession. Many producers who would have left under normal conditions postponed exit during this period. Along with accelerated rates of expansion and entry, this low exit rate lies at the root of the massive surpluses of the early eighties.

Regional Exit Rates

Different regions and States showed considerable differences in exit rates. While there are obvious connections between the exit rate of farms and the exit rate of cows and between the exit rate of cows and changes in milk production, exit rates cannot fully explain relative changes in milk production. Even within a State, producers of one type or in one area may be leaving rapidly while farmers of another type or area are expanding rapidly. Conversely, a State may be very stable, with low rates of exit, entry, and expansion.

In 1978, regional differences in the farm exit rate were dramatic, ranging from about 2 percent in the Northeast and Lake States to 13 percent in the Southern Plains. Southern

Table B.--Exit rates by region, 1978 and 1982

Region	1978	1982
	Percent of farms	
Northeast	1.9	1.1
Lake States	2.0	1.0
Corn Belt	3.4	1.2
Northern Plains	3.2	1.5
Appalachian	5.5	1.3
Southeast	10.8	1.4
Delta	9.0	1.5
Southern Plains	13.2	2.0
Mountain	3.9	1.4
Pacific 1/	3.8	1.6
U.S.	3.3	1.2
	Percent of cows	
Northeast	1.5	.7
Lake States	1.5	.7
Corn Belt	2.6	.9
Northern Plains	2.7	1.2
Appalachian	2.9	.9
Southeast	2.1	1.0
Delta	3.0	1.1
Southern Plains	3.5	1.2
Mountain	1.8	.6
Pacific 1/	1.5	.8
U.S.	1.9	.8

1/ Excludes Alaska and Hawaii.

regions had very high exit rates. The two Western regions also were above average. These regional differences may have been exaggerated by the statistical techniques used for the 1978 census.

Expressing the exit rate as the percentage of cows in exiting herds changed the picture in some important ways. The Lake States and Northeast remained low, while the southern regions stayed high. However, the grain-producing regions of the Corn Belt and Northern Plains had considerably above-average exit rates of cows, even though their farm exit rates were about average. On the other hand, the Pacific and Mountain regions had below-average exit rates for cows but above-average rates for farms.

Of the 5 major dairy States, Wisconsin, New York, and Pennsylvania had below-average rates in terms of both farms and cows. California had an average farm exit rate but a below-average cow exit. The reverse was true for Minnesota.

By 1982, the exit rate of farms had fallen sharply in all regions. Regional differences were much smaller than in 1978 but showed much the same pattern. Once again, the Lake

States and Northeast lost the smallest share of their producers, while the Southern Plains had the largest. Exit rates in the Southern regions were again relatively high, but not higher than in the Western regions.

Exit rates of cows also dropped in all regions, while regional differences narrowed. The Mountain States had the lowest cow exit rate, reflecting the virtual absence of departing producers in the southern portion of the region. The rates of the Northeast and Lake States were below average and the Pacific rate matched the national rate. Other regions posted above-average rates, with the highest occurring in the Northern Plains and Southern Plains. The highest cow exit rates of 1982 were considerably below the lowest rates of 1978.

As in 1978, Wisconsin and Pennsylvania had exit rates considerably below the U.S. average. The 1982 exit rates of California, New York, and Minnesota were average or higher in terms of both cows and farms. In 1978, exit rates for these States were average or lower.

Structural Change and Supply Adjustment

While the number of observations is quite limited, expansion and entry appear to add about 1 percent annually to the total cow herd under "normal" conditions (including cows purchased from dispersed herds). Similarly, the average size of exiting herds is about two-thirds that of continuing herds. These relationships enable estimation of the structural changes necessary to reduce surplus milk production.

The market for dairy products is expected to grow at an annual rate of about 1 percent between 1985 and 1990. If 1990 milk production is 2 percent lower than what is expected this year, that output will satisfy commercial needs and result in about 3 billion pounds of CCC purchases. If output per cow rises at a 2-percent annual rate (the average for 1978-83 2/), this quantity will be produced by 89 percent of the current herd.

Even gradually reducing the milk surplus will involve painful alterations in rates of structural change. Correcting the imbalance with lower milk prices would force the exit rate far above the levels of the last 15 years. Use of supply-control measures would lessen the needed acceleration in the exit rate. However, it would severely restrict new producers or those who would normally grow.

If lower milk prices reduce entry and expansion rates to more typical levels, about 5 percent of dairy farmers (holding more than 3 percent of the cows) must leave each year to bring the surplus down to 3 billion pounds by 1990. The proportion of cows in exiting herds would be similar to 1969, although the farm exit rate would be somewhat lower. There has not been an extended period of such exit rates since the sixties. However, these rates are well below the annual rates of 8 percent of producers and 5 percent of the cows needed to achieve the same correction by 1987.

Mandatory supply-control measures would shift much of the burden of adjustment to new and expanding producers. If continuing producers were limited to the number of cows they now own, the exit rate would still have to be triple the 1982 rate to meet the 1990 goal. Alternatively, a continuation of the 1982 exit rate would force remaining producers to reduce cow numbers about 1.5 percent per year.

Correction of the current surplus probably will result in a temporary loss of efficiency in the industry--regardless of the manner of correction. Some efficient but financially vulnerable farmers will be lost, while other efficient producers will be unable to expand. This is a hidden cost of large surpluses and inflexible support prices.

2/ Percentage gains in output per cow have trended downward by about 0.06-0.08 per year since 1960. However, pending changes in technology make a 2-percent rate a conservative estimate.

EMERGING DAIRY TECHNOLOGY

by

Richard Fallert and Carolyn Betts 1/

ABSTRACT: This article explores emerging technologies in milk production and processing: nutritional supplements, bovine growth hormone, farm computer application, embryo transfers, reverse osmosis, ultrafiltration, and freeze concentration. Nationwide adoption of these new technologies could result in fewer and larger dairy herds with fewer cows needed to produce required milk supplies. This would require increased investment for the remaining herds and provide a more storable milk supply with associated efficiencies in milk marketing and regional implications because of lower costs of transporting milk among areas.

Keywords: Milk, production, technology, marketing, structural adjustment.

Over the past 20 years, technological advances have contributed to the substantial changes seen in the productivity and structure of the dairy industry (table 1): the dramatic decrease in the number of farms with milk cows, fewer dairy cows with increasing productivity per cow, and increased size and specialization of farms in dairying. These changes have been stimulated by technological advances such as bulk handling of milk, barn cleaners, silo unloaders, and better milking equipment and housing systems. Greater knowledge of animal nutrition, better ways to produce quality feeds, and use of byproduct feeds have contributed to the increasing productivity of the dairy cow—as has the development of artificial insemination and progeny testing. In addition, the progress made in control and eradication of disease has boosted productivity and profitability of dairying. Improved transportation, refrigeration, and plant and processing technology have also influenced the location, structure, and efficiency of milk processing and marketing.

A historical precedent for the adoption of new technology was seen in the adoption of bulk tanks on farms in the 1950's. The spread was rapid when both handlers and producers saw the economies to be achieved and the price premiums possible for producers. The capital improvements associated with bulk tank installation (milking parlors, milking machines, new water systems) presented dairy farmers with major decisions: should they remain in dairying? Should they increase the size of their operations? Should they adopt the associated bundle of new technologies? The overall result of the adoption of bulk tanks was fewer and larger milking herds, requiring increased investment and providing a much more storable and transportable milk supply. This in turn had implications for breaking down regional barriers to milk movement and milk marketing.

Further new technologies that could have major impact upon the dairy industry are currently being extensively researched. Developments in feed additives, hormone injections, and reproduction and computer technology could be used to increase productivity and efficiency of milk production. In the aggregate, increased milk production will lower milk prices, decrease returns to producers not adopting the new technology, and cause major structural adjustment, since fewer cows and fewer dairy herds will be needed to produce an adequate milk supply.

On the milk processing side, since milk is a relatively bulky product containing about 87

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Table 1.--Changes in the U.S. dairy industry, 1964-84

Item	1984	1964	Percent change
Number of cows	10,978,000	15,660,000	-30
Number of farms	283,550	1,226,318	-77
Number of cows/farm	39	13	+200
Pounds/cow/year	12,495	8,099	+54
Total milk production (Million pounds)	135,444	126,967	+7

percent water, the emerging membrane and concentrating technology for removing water or separating milk into its components has potential for improving the efficiency of the industry. Major changes in the structure and location of the milk production and processing sectors will likely result from this emerging technology.

Emerging Milk Production Technologies

Nutritional Supplements

Basic research in animal nutrition over the past 20 years has led to the development of isoacids, a generic term used to refer to a mixture of four fatty acids: iso-butyric, iso-valeric, 2-methyl-butyric, and valeric. These are all naturally found in the rumen of cows, but they can be fed as a supplement to increase their concentration in the digestive system.

Increasing the concentration of these fatty acids in the rumen allows more nutrients from a given amount of feed to be available to the cow to produce milk. The acids work in two ways. First, increasing the fatty acid level raises the rumen bacterial population, which is responsible for breaking down (fermenting) the feed the cows consume, making the nutrients usable by the cow's system. Secondly, the microbes synthesize protein out of nonprotein compounds, thus increasing the feed value (quality) of feeds low in crude protein, such as corn silage.

Dr. Robert Cook at Michigan State University (MSU) has worked on the commercialization of isoacids since 1962. Trials run at MSU, Virginia Polytechnic Institute, Cornell University, and eight other land grand universities showed that isoacids increased feed efficiency and boosted milk production 8 to 10 percent. Under field conditions, one could expect an average gain of 3 percent more milk at the same feeding levels, or the same amount of milk produced on 3 percent less feed. It takes 6 weeks to realize a response to isoacid feeding, and the response continues as long as the supplement is fed.

The Food and Drug Administration (FDA) approved commercial use of isoacids in 1984. The Eastman Chemical Division of Eastman Kodak is currently marketing a mixture of isoacids in Michigan under the trade name IsoPlus. Eastman plans in November to expand marketing to another 18 States: California, Minnesota, Wisconsin, Iowa, Illinois, Indiana, Ohio, Pennsylvania, Maryland, New York, and eight New England States. Marketing will be limited to feed dealers and milk producers in these States because only limited supplies of IsoPlus are now being produced in a pilot plant. However, a worldscale plant is under construction in Longview, Texas, and it should be ready for production in mid-1986. Marketing could then be expanded throughout the United States and internationally.

Bovine Growth Hormone

Bovine Growth Hormone (bGH) is a hormone that occurs naturally in cattle and regulates body metabolism and therefore milk production. The hormone is a protein originating in the pituitary gland. Previously, the hormone was isolated and extracted from

Table 2.--Preliminary evaluation of bGH commercial viability, given alternative milk prices and feed costs

Milk price	Additional gross revenue/day (assuming 8 pounds/day production increase)	Range of additional feed costs	Residual
	Dollars per cwt		
13.50	1.08	.40 - .64	.68 - .44
12.50	1.00	.40 - .64	.60 - .36
11.50	.92	.40 - .64	.52 - .28
10.50	.84	.40 - .64	.44 - .20
9.50	.76	.40 - .64	.36 - .12
8.50	.68	.40 - .64	.28 - .04
7.50	.60	.40 - .64	.20 - (-.04)

Source: (1).

the pituitary glands of slaughtered animals. Obviously, this was expensive, slow, and produced only limited quantities. Now, however, the gene responsible for bGH production has been transferred from animal to ordinary bacteria cells. These altered bacteria can be reproduced on a large scale and the resulting growth hormone produced can be isolated, purified, and made available for commercial use in large quantities (1). 2/

There are substantial economies of scale in bGH production. Economic engineering studies at Cornell indicate that it will cost about $4.25 per bGH gram for a plant capacity of 500,000 cow doses per day (44 milligrams equal one dose). But costs can be scaled down to approximately $2.00 per gram for a plant capacity of 7 million doses per day.

Injection of bGH increases body metabolism, which in turn raises blood flow through the mammary gland, resulting in increased milk production. Research has shown milk yields to increase 10 to 40 percent within 3 days of initial injections and to persist as long as the injections are continued.

In trials thus far, the bGH treatment was given during middle and late lactation; the increases in milk production during early lactation (first 91 days postpartum) are less than when injections are given later. At the greatest response rate (40 percent), the administration of bGH during middle and late lactation yields 25 percent more milk per cow per full lactation.

The increased milk production does require higher nutrient intake to sustain the physical condition of the cow. However, there is an increase in efficiency, since fewer cows are required to produce a given amount of milk. Thus, a smaller percentage of feed goes towards the maintenance of the cow herd and a larger percentage goes into the production of milk. Data in table 2 indicate that the residual returns to bGH use would be quite substantial even at relatively low milk prices. The data in the table assume an 8-pound-per-day production increase and a range in additional feed costs of 40-46 cents per cwt. The residual is what is available for purchasing bGH, covering additional hauling costs, and meeting associated expenses. At milk prices as low as $8.50 per cwt, the residual returns range from 4 to 28 cents per cwt.

Although the FDA has approved the sale of milk in New York from cows in research herds injected with bGH, the agency has not approved bGH for general commercial use. Multiple lactation effects have not been studied and longer trials need to be conducted for FDA to approve bGH use. Estimates on the time of FDA approval range from 2 to 10 years. The most likely time is within 3 years, as bGH is a naturally occurring protein.

A number of chemical companies are conducting efficacy trials to obtain regional data on the effects of bGH. Some field testing of bGH is also occurring in Europe and

2/ Numbers in parentheses refer to references at end of the article.

South America. It is possible that other countries will have commercial access to bGH before the U.S. dairy industry does, depending on the stringency of approval requirements in the different countries.

Producer adoption rate surveys conducted by Cornell indicate that 70 percent of the producers surveyed would adopt the new technology within 3 years of commercial availability. Preliminary research results show that bGH can greatly increase the financial viability of all dairies in the short run (1). The increased management required for the daily injections and proper feeding suggest that larger herds with better and more specialized management would be at an advantage. More research needs to be conducted to determine whether herd location (climate), herd size, productivity, and management have any effects on bGH's usefulness and profitability.

Farm Computers

Computerized feeding equipment allows cows to "serve themselves" to the specific amount of feed required for their level of milk production. This technology ensures that low-producing cows are not inefficiently overfed and provides high producers with access to adequate nutrition to maximize their potential output and profitability. Also, the computer system allows the cow's actual feed intake to be monitored, which can aid in the detection of health problems.

Research has indicated that computerized feeding can result in a 5-percent increase per cow in milk yield, with a 1-percent increase in butterfat--without raising total feed required for the herd. Computerized feeding is generally considered to be more advantageous for increasing milk yield or feed efficiency than for saving labor.

An important aspect of computerized feeding technology is its potential use with bGH, nutritional supplements, or three-times-per-day milking. With these regimens, proper ration formulation and nutrition management are critical in obtaining the increased milk yields desired and keeping animals healthy and productive over multiple lactations.

There are several types of computerized feeding systems on the market now, costing between $10,000 and $30,000 per herd, and their popularity is increasing. Other uses of computers on farms--heat detection, mastitis detection, udder health evaluation, and milk yield measurement--are being researched worldwide. Use of microcomputers to assist in general record keeping and financial and herd management is also becoming more commonplace.

Embryo Transfer

Embryo transfer (E.T.) begins by super-ovulating high quality donor cows (generally exceptionally high milk producers) by administering hormones. The donor cow is then artificially inseminated, producing multiple embryos. The embryos are collected surgically or nonsurgically by flushing. Research indicates that up to 44 embryos can be recovered from a single flushing. The viable embryos are transferred to recipient cows (cows that are healthy, but of any quality) whose estrus cycles have been synchronized by hormone injections to be ready to receive the embryos.

Splitting embryos after flushing and prior to transfer is relatively simple and inexpensive and is being done routinely on a commercial scale. The success rate in producing live births is 55 percent per demi-embryo (or 110 percent on the basis of the original whole embryo).

Embryos, like sperm and many other kinds of cells, can be preserved at the temperature of liquid nitrogen for decades, maybe centuries. This is of enormous value for cases where not enough recipient cows are available to receive the embryos, since the embryos can be preserved while waiting for a properly synchronized recipient. In addition, cryopreservation of embryos expands domestic and export markets.

E.T. is becoming more commonplace. In 1974, there was only 1 registered Holstein male and 1 registered Holstein female calf resulting from embryo transfer (2). These figures reached 2,854 and 4,403, respectively, in 1982. E.T. is having a substantial impact on the overall productivity of the U.S. dairy herd

since it is estimated that nearly 50 percent of the young Holstein bulls in artificial insemination (A.I.) dairy bull studs are from embryo transfer.

Currently, however, if the goal is to increase milk yields of a herd, embryo transfer is too expensive to be economically feasible; more genetic improvement for milk yield is possible through using genetically superior A.I. sires. Therefore, embryo transfer technology's main current economic value seems to be for dairymen marketing embryos of registered breeding cattle and for producing bulls for use in artificial insemination.

Replacement females can be produced by embryo transfer for less than the cost of purchasing registered cattle of similar quality. The main reason for the profitability of embryo transfer is the demand for registered U.S. dairy cattle of good quality--both domestically and in foreign countries trying to improve their dairy herds' genetic base. Foreign demand is especially vigorous, since embryos can be transported more economically than cows.

Emerging Processing Technologies

Reverse Osmosis

Reverse osmosis (RO), a membrane concentration process that removes water from milk, has stimulated some interest as a way to preconcentrate milk for cheesemaking (3). RO is not being used extensively in commercial operations, but it is being studied in academic pilot plants. Like evaporation, RO removes only water from milk and the process requires no heat.

Ultrafiltration

Ultrafiltration is a process in which milk is filtered under pressure through a series of semipermeable capillary membranes of different sizes. The membranes separate milk into various components by allowing small molecules (such as water, some lactose, and some of the salts) to pass, but holding back larger molecules (such as protein and milkfat). Ultrafiltration, like RO, can take place at the farm, at an assembly point near a group of farms, or at the processing plant. This membrane fractionation process differs from RO in that it concentrates the protein and fat fractions of the milk while removing some of the water, lactose, and minerals (4).

Because of its bulk, milk is costly to transport--about 35 cents per cwt per 100 miles, national average. Approximately 50 percent of the water in milk can be removed by ultrafiltration, cutting transportation costs. The lowered bulk of the milk will also lower cooling, storage, and other further-processing costs.

The water, lactose, and salts removed in ultrafiltration can be fed to the cattle. This decreases waste disposal problems at the plant, especially when the milk is to be used for cheesemaking, which normally generates a large amount of whey, requiring disposal. In addition, ultrafiltration can increase the capacity of a given cheese plant, as the concentrated milk requires less vat capacity to produce a given amount of cheese.

There are economies of scale involved in ultrafiltration. The equipment is costly and complex to operate. Initial studies show that it is currently economically justifiable only for herds of 100 cows or more. Thus the equipment may favor adoption by herds large enough to support specialized staff and better management.

Freeze Concentration

Freeze concentration is a process for removing water and concentrating milk. It is being used to a limited extent in concentrating orange juice. The main potential advantage in the dairy industry is avoiding the cooked flavor that heat-concentrated and dried milk products take on from current condensing and drying methods. Limited research indicates that capital costs of the equipment are high relative to current technology and energy costs of operations are at least as costly as current systems.

None of these processing technologies has been approved by the FDA for use in the manufacture of dairy products marketed in Interstate Commerce. Further research is needed to obtain information required for FDA approval.

However, both reverse osmosis and freeze concentration are potential methods of

concentrating milk for reconstitution into fluid milk products, since these processes remove only water from milk and the final composition of the reconstituted milk would be similar to regular milk.

If approved by FDA and proven economically viable, these technologies could have a tremendous impact on the location and structure of the fluid milk processing industry and, in turn, the location of milk production itself.

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The economic health of U.S. agriculture will come under close scrutiny at Outlook '86, USDA's 62nd annual agricultural outlook conference, which will be held in Washington, D.C., December 3-5.

OUTLOOK '86

Shorter and tighter than last year, the conference will provide policymakers with a complete overview of the agricultural situation in 2-1/2 days. Following registration Monday afternoon, Dec. 2, the conference gets underway Tuesday at 9:45 a.m. with the outlook for the general economy, agriculture, trade. Sessions for the remainder of the day will focus on the economic well-being of the farm sector, including the state of agriculture, farm income, credit, and the 1985 farm bill. Wednesday's sessions will cover the major farm commodities, as well as family economics and nutrition.

The Dairy 1986 Outlook Session will be held on Wednesday, Dec. 4. It will be part of an overall session on the major grains and livestock commodities, running from 8:30 to 12:30 a.m. A follow-up session on Dairy with representatives from Government agencies and international organizations is scheduled for 3:00-4:30 p.m. that day.

All speeches in the Jefferson Auditorium can be accessed live by dialing (900) 410-JEFF. The service costs 50 cents for the first minute and 35 cents for each additional minute.

For a copy of the preliminary Outlook '86 program, which contains time and location for each session, please write: Outlook '86, USDA/WAOB, Room 5143 South, Washington, D.C. 20250.